



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, D. C. 20555

ACRSR-1681

PDR

February 21, 1997

The Honorable Albert Gore, Jr.  
President of the United States  
Senate  
Washington, D.C. 20510

Dear Mr. President:

I am pleased to transmit to the Congress the 1996 report of the Advisory Committee on Reactor Safeguards on the U. S. Nuclear Regulatory Commission's Safety Research Program. This report is required by Section 29 of the Atomic Energy Act of 1954, as amended by Section 5 of Public Law 95-209.

Sincerely,

R. L. Seale  
Chairman

Enclosure:

U. S. Nuclear Regulatory Commission, "The Advisory Committee on Reactor Safeguards Report on Nuclear Safety Research and Regulatory Reform," dated February 1997

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, D. C. 20555

February 21, 1997

The Honorable Newt Gingrich  
Speaker of the United States  
House of Representatives  
Washington, D.C. 20515

Dear Mr. Speaker:

I am pleased to transmit to the Congress the 1996 report of the Advisory Committee on Reactor Safeguards on the U. S. Nuclear Regulatory Commission's Safety Research Program. This report is required by Section 29 of the Atomic Energy Act of 1954, as amended by Section 5 of Public Law 95-209.

Sincerely,

A handwritten signature in cursive script, reading "R. L. Seale", is positioned above the printed name.

R. L. Seale  
Chairman

Enclosure:

U. S. Nuclear Regulatory Commission, "The Advisory Committee on Reactor Safeguards Report on Nuclear Safety Research and Regulatory Reform," dated February 1997

A REPORT TO THE CONGRESS  
OF THE UNITED STATES OF AMERICA

ON

NUCLEAR SAFETY RESEARCH AND REGULATORY REFORM

BY

THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
U.S. NUCLEAR REGULATORY COMMISSION

FEBRUARY 1997

THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS REPORT  
ON NUCLEAR SAFETY RESEARCH AND REGULATORY REFORM

The Advisory Committee on Reactor Safeguards, in the past, reported on very specific reactor safety research issues and programs. In light of the diminished resources available to support the U.S. Nuclear Regulatory Commission's Safety Research Program, we have chosen, instead, to report on the potential effects of a reduced Safety Research Program on regulatory reform and the ability to provide adequate safety oversight for a changing nuclear industry.

A vigorous research program dealing with the safety of commercial nuclear power production has served the Nuclear Regulatory Commission and the public well in the past. The continued availability of unbiased safety research information will be essential as the Nuclear Regulatory Commission establishes itself as the leader in the national effort to reform the regulatory process to focus on real risks, continued safety of operating nuclear power plants, and the performance of licensees. At the same time, initiatives taken by the commercial nuclear power industry in response to ongoing and anticipated deregulation of electrical power generation make it even more important that the Nuclear Regulatory Commission continue to have a Safety Research Program that provides the information needed to modify and improve its regulations to protect public health and safety.

From the inception of the civilian use of nuclear energy to generate electrical power, public safety has been of paramount concern. Initially, little experience and few industrial safety standards were available to ensure that nuclear power could be generated safely. As a result, prescriptive, highly conservative approaches that blanketed all aspects of nuclear power generation

were adopted by both the regulatory authority and the industry. Faults and vulnerabilities identified through operation of nuclear power plants were used to add layers of protection on this regulatory structure. Indeed, regulation of nuclear power generation has been successful in protecting public safety in this country. But, safety has been achieved through highly conservative regulation at great cost to both the producers and consumers of nuclear power.

As nuclear power generation has matured, experience has been gained in our understanding of the real risks of nuclear power. The Safety Research Program has enabled the Nuclear Regulatory Commission to develop a method called probabilistic risk assessment that can provide quantitative measures of these risks. The sophistication of this understanding has reached the point that it is now possible to initiate a reformation of the regulatory structure for nuclear power generation. This reformation will focus attention on what is significant to safety and at the same time will allow the industry to identify and use cost-effective strategies to mitigate risks. Reformation of regulation of all types to focus on risk is, of course, a national priority. The Nuclear Regulatory Commission is taking the lead in this national effort with its policy of risk-informed and performance-based regulation. Based on information that has come from the Safety Research Program, operational experience, and the ability to quantify risk, the Nuclear Regulatory Commission has been able to set forth safety goals that define how safe is safe enough. By working with individuals experienced in plant operations and using the tools of risk analysis, the NRC can now identify regulations that do not contribute to safety, and it will be able to define a rational, cost-benefit basis for imposing additional regulatory requirements.

Steps are being taken in the direction of risk-informed and performance-based regulation. The performance-based maintenance rule (10 CFR 50.65) is a tangible accomplishment. Rather than imposing bureaucratic prescriptions on every aspect of safety system maintenance, this rule allows the industry to find creative strategies to meet performance objectives approved by the Nuclear Regulatory Commission based on risk information. Satisfactory performance by licensees is rewarded by reductions in regulatory burdens while performance failures elicit increased regulatory scrutiny.

The Safety Research Program has aided the Nuclear Regulatory Commission in the development of standards for regulatory use of risk assessment. This would permit additional uses of this approach to focus dwindling resources on issues of most importance for protecting public health and safety. Target applications of these new standards are in-service inspection, in-service testing, and technical specifications for reactor safety systems. Continued research will be essential for further regulatory reforms.

New challenges to the regulation of nuclear power are emerging. These challenges come from the deregulation of electrical energy production and the need for the nuclear power industry to become more cost competitive. The nuclear industry is aggressively pursuing changes to remain economically viable. These changes could have significant safety implications that will require regulatory approval when they affect the licensing basis for nuclear power plants. Among the changes under consideration are increased fuel lifetimes, elevated operating power, digital instrumentation and control systems, and downsized work forces. Each of these changes could challenge the existing regulations for the protection of public health and safety. We believe that applied regulatory research programs will be required to develop bases/criteria for regulatory approval of these changes. Of



particular importance are the changes that may affect human performance in the operation of nuclear power plants.

Funding for research activities has fallen by a factor of about 3 over the last 10 years and all evidence points toward continued reductions in the future. While much of this decrease can be attributed to the maturation of the technology, funding for the Safety Research Program has been reduced to a level that may not allow a cost-effective response to these new challenges. The Nuclear Regulatory Commission now does not have the technical tools needed to evaluate all of the safety implications of extending fuel lifetimes to the extent the nuclear industry has requested. It cannot evaluate quantitatively the risk implications of personnel reductions and modernization that are being proposed by the nuclear industry. The Safety Research Program will have to be sustained and even augmented if the Nuclear Regulatory Commission is to complete its transformation to risk-informed and performance-based regulatory approach. Without the needed research support, the Nuclear Regulatory Commission may be forced to rely on historical, conservative, costly regulations not necessarily focused on risks. Safety innovations by the industry may be stifled. The opportunity to use regulation of nuclear power as an example of successful regulatory reform may be lost.